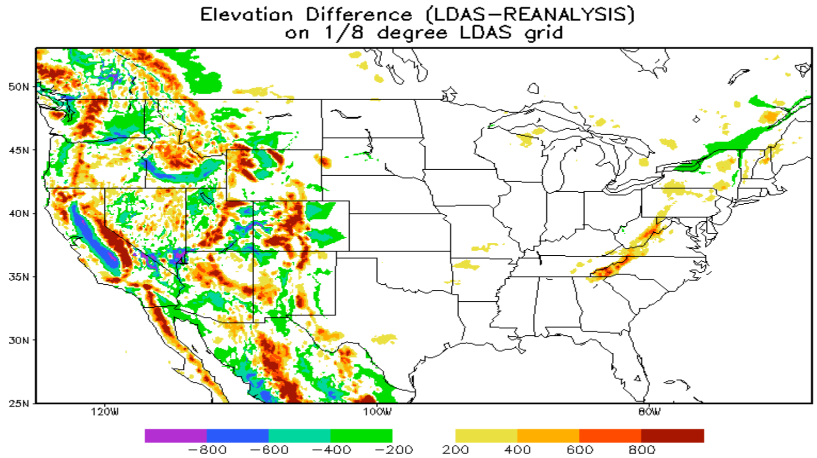

Fig.1 Significant surface elevation difference between the 1/8th degree NLDAS topography and NCEP-NCAR Reanalysis topography on 1/8th degree NLDAS grid. Unit is m.

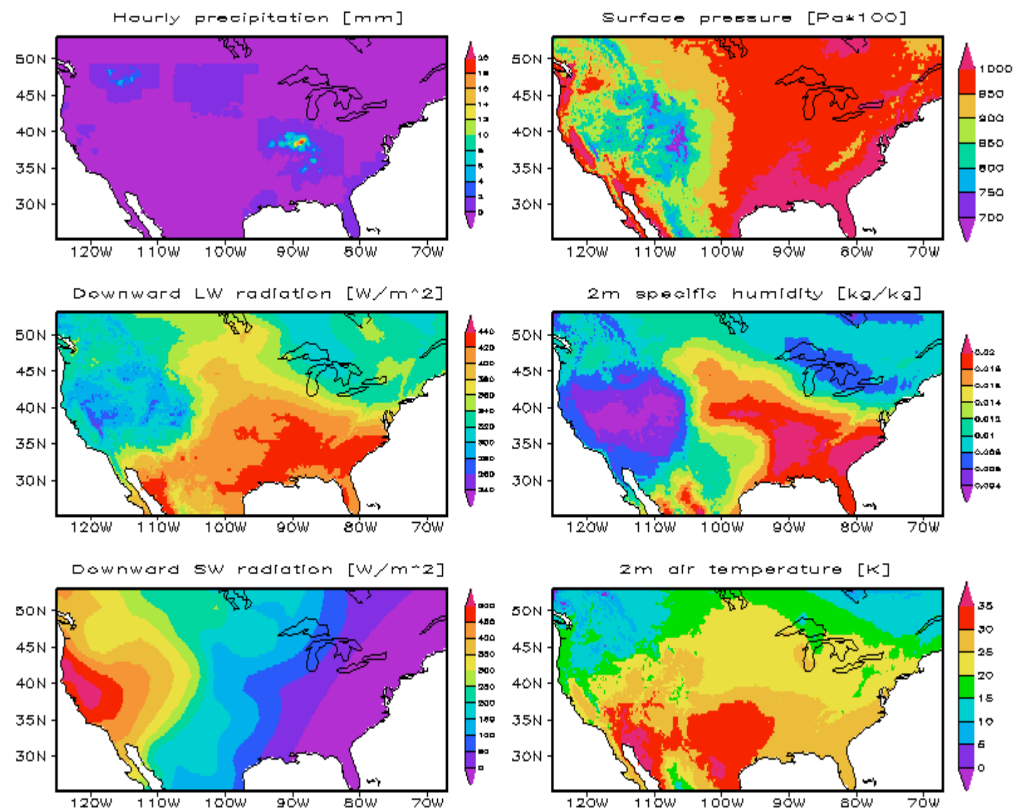

Fig.2 The hourly forcing fields (P, IR↓, S↓, p, q, T_a) at 01Z16Jul1993 are shown here as examples to display the characteristics of high spatial resolution & orographic effect on the NLDAS forcing data set.

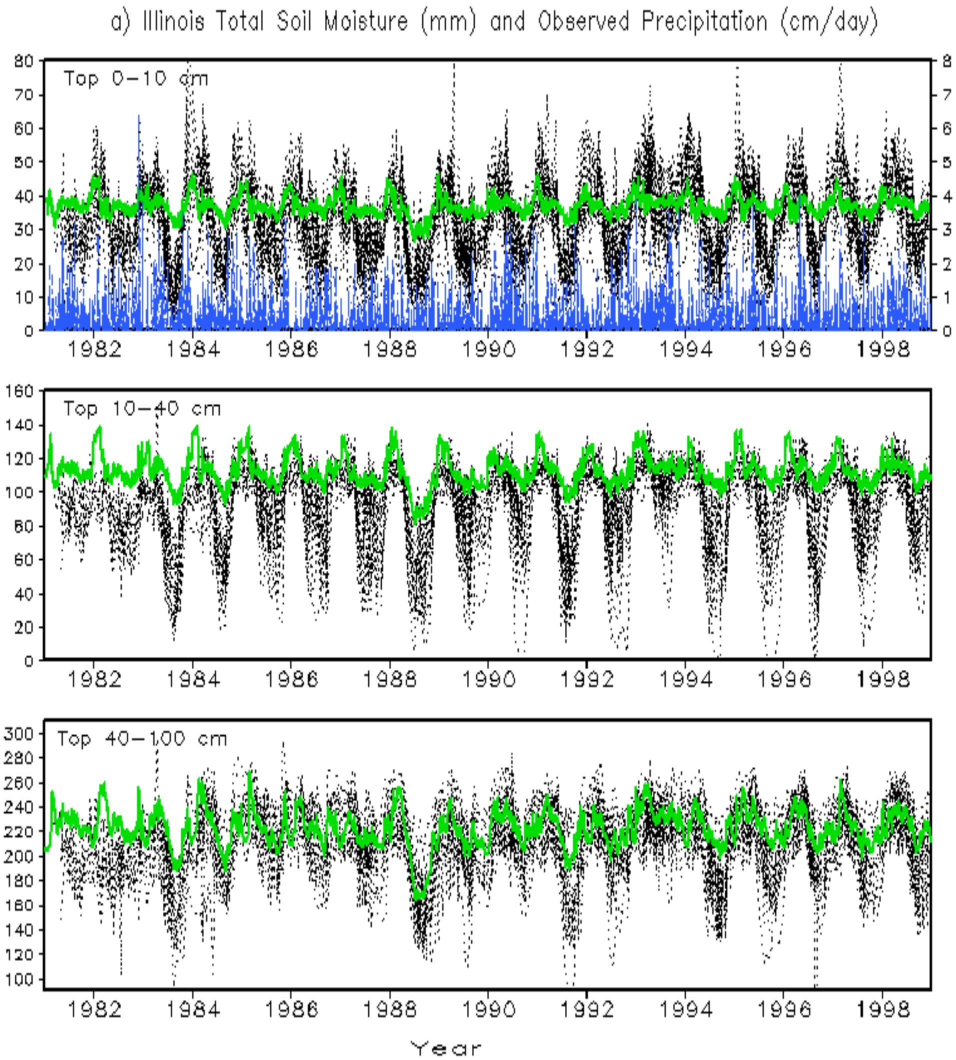

Fig.3 The time evolution of simulated daily total soil moisture (green solid) in the top three model layers and their relevant observations (black dots, all instantaneous data for all stations) in Illinois from 1981 to 1998, together with the observed daily precipitation (blue dash-dot, in top panel).

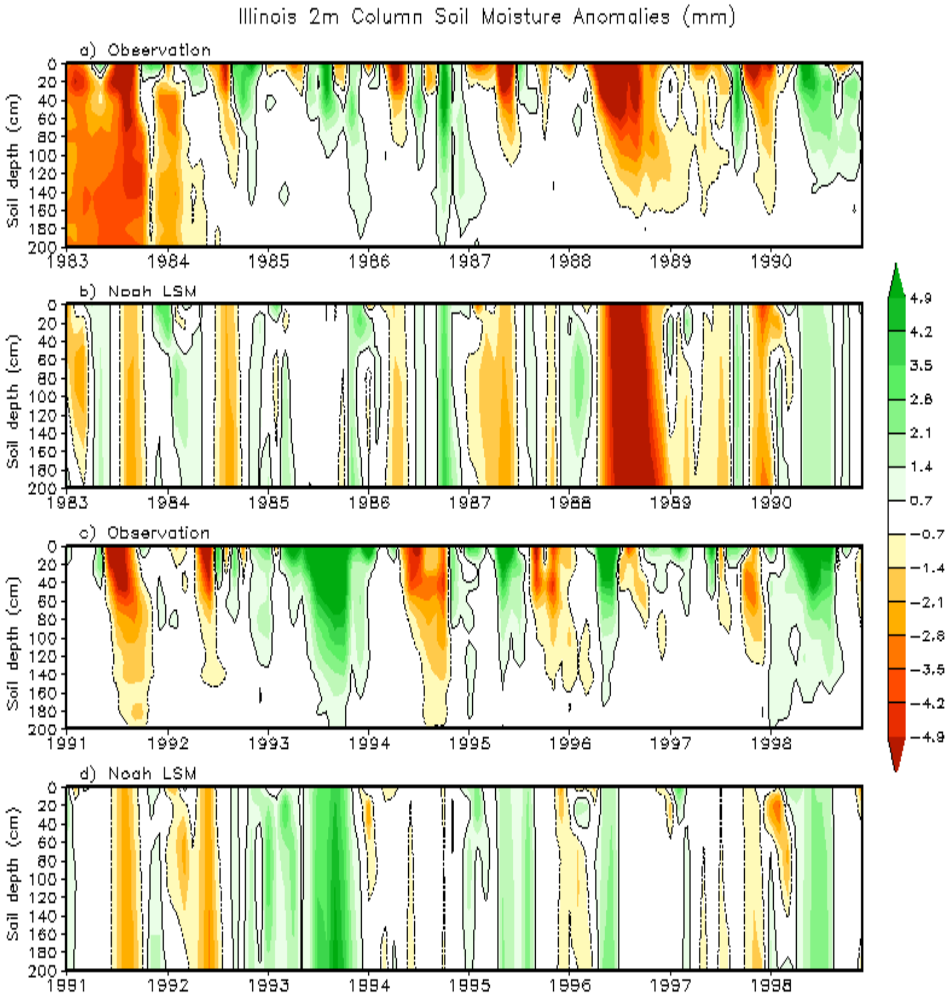

Fig.4 Observed and simulated vertical distribution of top 2 meter soil moisture anomalies averaged in Illinois from Jan. 1983 to Dec. 1998. The simulations are for 4 model layers: 0-10 cm, 10-40 cm, 40-100 cm and 100-200cm. The observations were made for 0-10 cm, 10-30 cm, 30-50 cm, 50-70 cm, 70-90 cm, 90-110 cm, 110-130cm, 130-150cm, 150-170cm, 170-190cm and 190-200cm. The units are mm of water per 10 cm of soil.

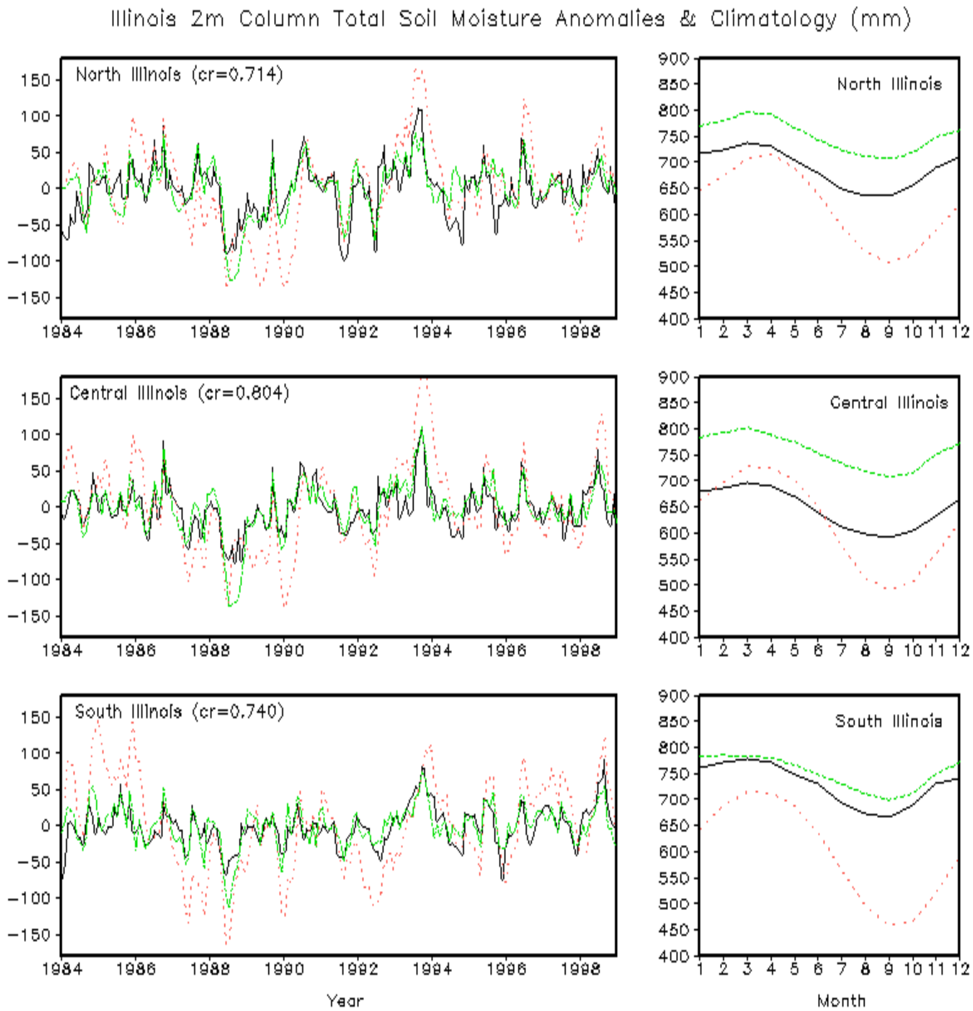

Fig.5 The annual cycle (right) & anomalies (left) of the observed & simulated 2 meter column soil moisture in the north, central & south Illinois from 1984 to 1998. Black solid line is observation and green dash line is 51 year Noah NLDAS Run and red dot line is the Regional Reanalysis.

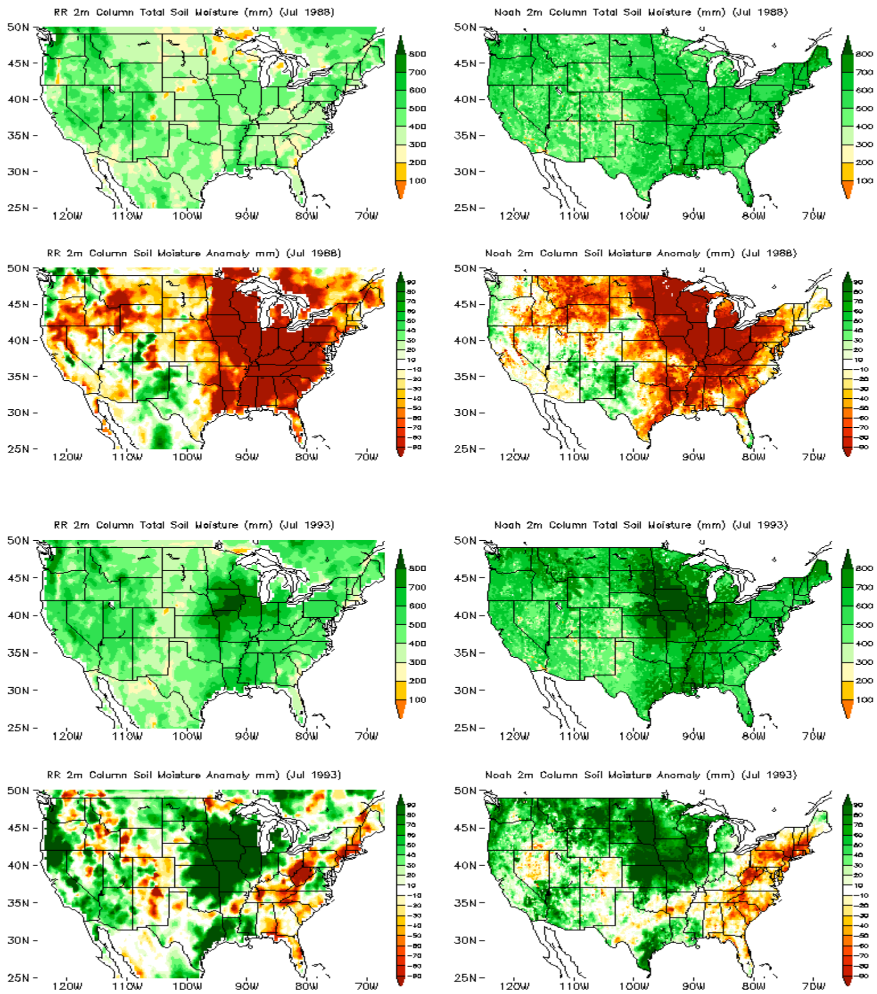

Fig.6 Simulated extreme land surface hydrologic events: 2m column soil moisture anomalies for 1988 drought and 1993 flood.

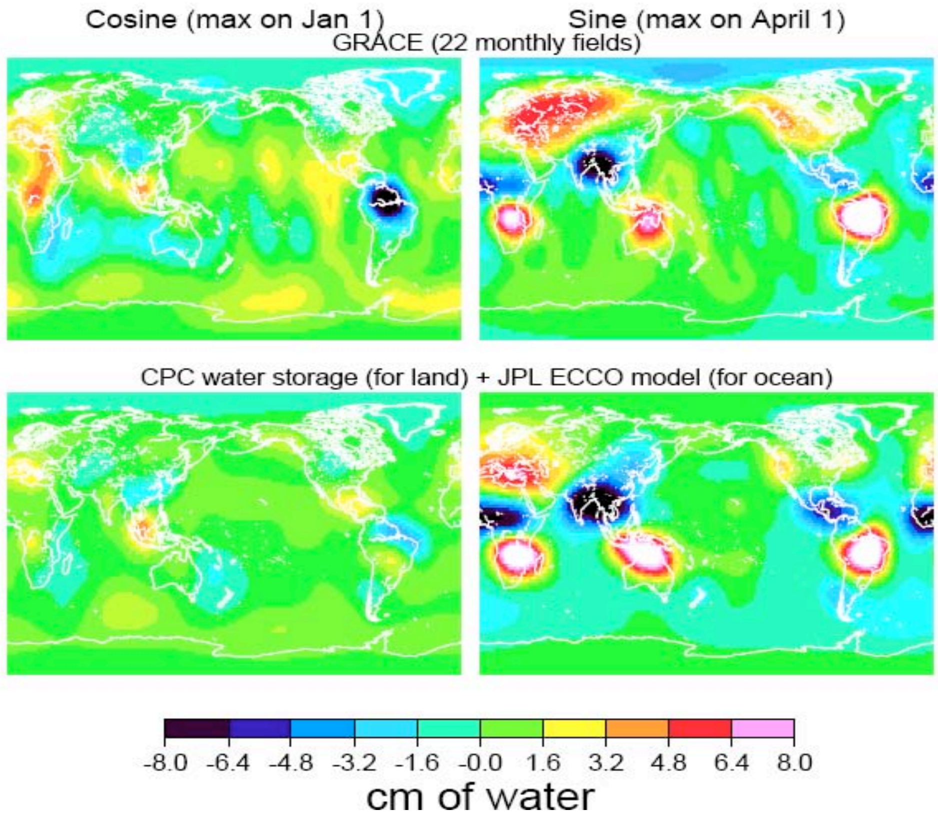

Fig.7 Display of the sine and cosine terms of the annual variation in mass as seen by GRACE and calculated by CPC's soil model for 2002-2004. Since soil moisture has its extremes near March and September in nearly all climates the sine term dominates. Broadly speaking GRACE and the model agree, both in pattern and in magnitude. Some of the spill-over into the ocean has to do with de-convolution of spherical harmonics., although in the case of GRACE there may also be as-yet-unsolved problems with removing all signals, other than soil moisture.

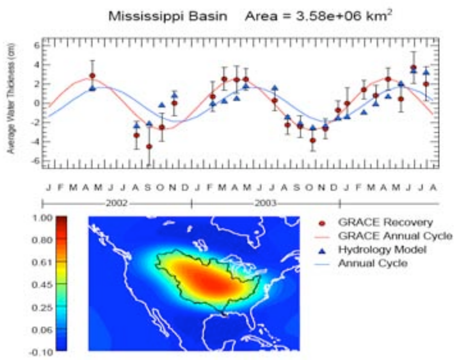

Fig.8a Comparison of GRACE and CPC soil model for the Mississippi Basin 2002-2004. The lower figure shows the approximation of this area's weighting function due to spherical harmonics. GRACE sees a somewhat stronger annual cycle in soil moisture and extremes that occur at least one month earlier.

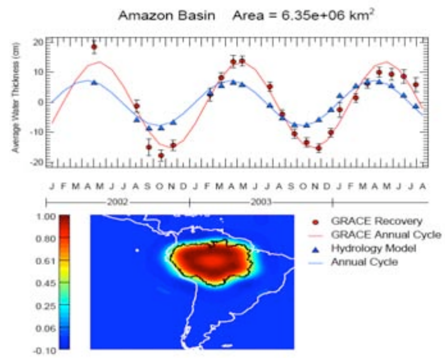

Fig.8b Same as Fig. 3, but now the Amazon Basin. Again the model has a weaker annual cycle, but the phase difference is less than in the Mississippi. In the Amazon the CPC soil model would benefit from greater than 76 cm holding capacity – this limitation

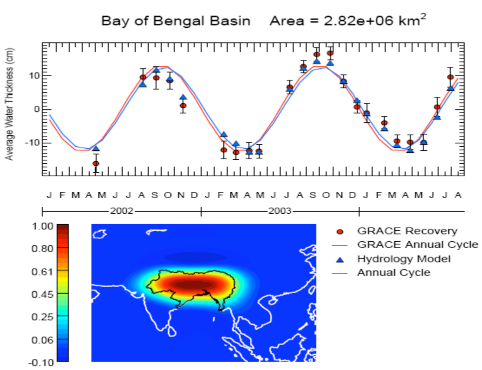

Fig.8c As Fig. 3 and 4. In the Bengali Basin GRACE and CPC soil model are a perfect match.

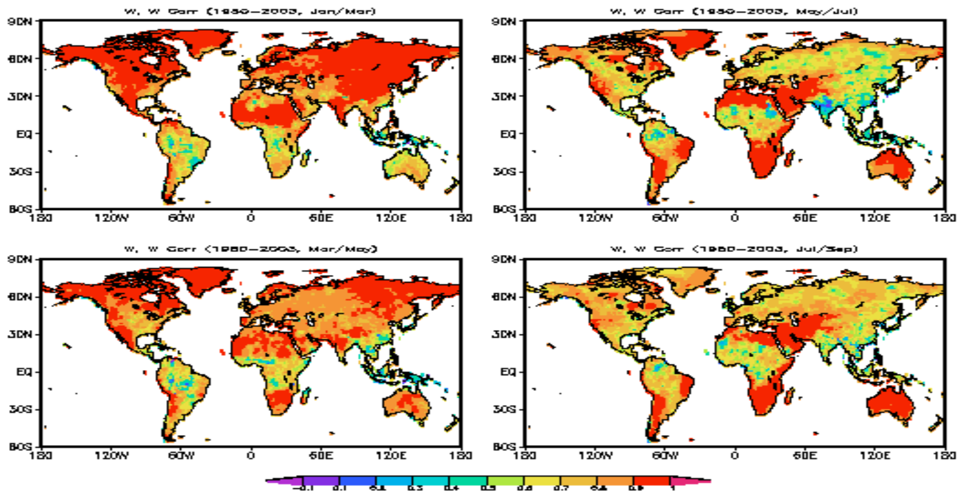

Fig.9 Auto correlations of the global land surface soil moisture,which show that cold seasons and dry areas often have longer memory than those in warm seasons and wet areas.

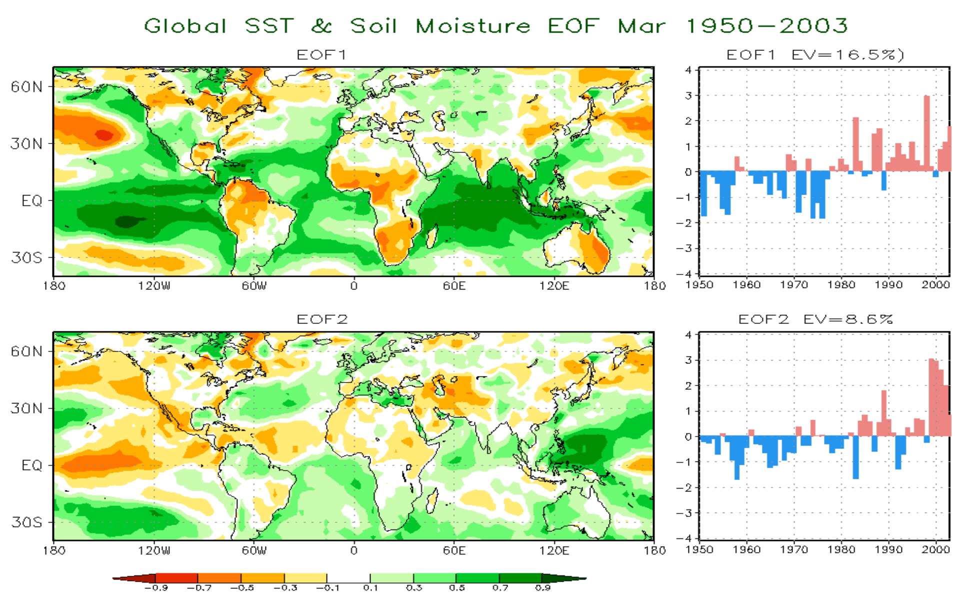

Fig.10 EOFs & PCs of the global lower boundary (normalized SST and soil moisture) for March 1950-2003. Both the El-Nino Southern Oscillation and long term trend modes are clearly seen in the leading EOFs & PCs of combined SST and soil moisture..